**Domain: Measurement and Data Standard Code: 4.MD.4 Teacher Name: J. Zaleski & L. Arnold**

Adapted from: Smith, Margaret Schwan, Victoria Bill, and Elizabeth K. Hughes. “Thinking Through a Lesson Protocol: Successfully Implementing High-Level Tasks.”

*Mathematics Teaching in the Middle School 14* (October 2008): 132-138.

**Title of Task\_\_Rainmaker!\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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| **PART 1: SELECTING AND SETTING UP A MATHEMATICAL TASK** | |
| What are your mathematical goals for the lesson? (i.e., what do you want  students to know and understand about mathematics as a result of this lesson?) | Students will represent and interpret data by making a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). They will solve problems involving addition and subtraction of fractions by using information presented in line plots. |
| * What are your expectations for students as they work on and complete this task? * What resources or tools will students have to use in their work that will give them entry into, and help them reason through, the task? * How will the students work—   independently, in small groups, or in pairs—to explore this task?   * How will students record and report their work? | Students will participate in the task, and everyone will be accountable for the information gathered.  Students will have access to math journals, pencils, crayons, markers, colored pencils, ruler, base ten blocks, any fraction manipulative and graph paper.  Students will work in small groups for this task.  Students will record their work in their math journals and/or their graph paper, and share it with the class on the document camera. They will explain their thinking to their group, and then to the class. |
| How will you introduce students to the activity so as to provide access to *all*  students while maintaining the cognitive demands of the task? | With the class, “make rain” according to these instructions:  This is a game of sound without words. Everyone stands in a circle. The leader starts a motion, and the motion goes around the circle like “The Wave” at a ballpark – you don’t start it until the person on your left does. This way, the sound moves and builds. You are making a rainstorm together. Don’t speak, just listen.  The motions are, in order:  1. Rub palms together (rising wind)  2. Snap fingers (first drops of rain)  3. Pat hands on thighs (harder rain)  4. Pat hands on thighs & stomp feet on floor simultaneously (adding thunder to rain)  5. Just pat hands on thighs (thunder moves on)  6. Snap fingers (rain is stopping)  7. Rub palms together (winds moving on)  8. Put hands at your sides (storm moves on)  9. When everyone is silent, you say, “And that’s making rain.”  Discuss with students what activities they like to do in the rain, then in the snow. In this task, they will plot precipitation in Utah, and then use the data to learn more about our state. |

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| **PART 2: SUPPORTING STUDENTS’ EXPLORATION OF THE TASK** | |
| As students work independently or in small groups, what questions will you ask to—   help a group get started or make progress on the task?   focus students’ thinking on the  key mathematical ideas in the task?   assess students’ understanding of  key mathematical ideas, problem- solving strategies, or the representations?   advance students’ understanding  of the mathematical ideas? | 1. What is your first step in creating your line plot? 2. How did you get your answer? 3. What process did you use? 4. What is another way to solve the problem? 5. Can you explain your answer to someone else? 6. How would you teach someone else how to make a line plot? 7. How would you teach someone else how to solve the problem? 8. Can you prove the answer? 9. Can you find another way to solve the problem? |
| How will you ensure that students remain engaged in the task?   What assistance will you give or what questions will you ask a  student (or group) who becomes  quickly frustrated and requests more direction and guidance is  solving the task?   What will you do if a student (or group) finishes the task almost  immediately? How will you  extend the task so as to provide additional challenge? | Redirect the students to the directions—ensure that they follow the correct order  Break the problem apart and look at little pieces at a time  Remind the students that they can use manipulatives  What patterns do you see that could help you solve the problem  If a group finishes early, they will get to work on the second task, creating a second line plot, then comparing the two plots, and the data therein. Students will also be asked to prove their thinking is correct. |

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| **PART 3: SHARING AND DISCUSSING THE TASK** | |
| How will you orchestrate the class discussion so that you accomplish your mathematical goals?   Which solution paths do you want to have shared during the  class discussion? In what order will the solutions be presented? Why?   What specific questions will you ask so that students will—  1. make sense of the  mathematical ideas that you want them to learn?  2. expand on, debate, and question the solutions being shared?  3. make connections among the different strategies that are presented?  4. look for patterns?  5. begin to form generalizations?  What will you see or hear that lets you know that *all* students in the class  understand the mathematical ideas that  you intended for them to learn? | Walk around the room, observing and encouraging groups in their discussions, while deciding who will present. Various members of the class will be called up to share. After several students have shared, volunteers who have something different will be allowed to share.  Start with solutions that are common among many students, then those who have different ideas will share.  What were the different ways to represent a line plot? How were the line plots the same? How were they different?  What different ideas did you get from observing how others solved the problem?  Debrief the task with the class talking about the mathematical concepts that were taught. Make sure the objective for the lesson was reached. |

Rainmaker!

You are a meteorologist at KGRZ News that has been assigned to plot the average monthly precipitation of Salt Lake City. Using the chart below, create a **line plot** of Salt Lake City’s average monthly precipitation.

Salt Lake City Average Monthly Precipitation

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| January | February | March | April | May | June | July | August | September | October | November | December |
| 1 3/8 in. | 1 3/8 in. | 2 in. | 2 in. | 2 1/8 in. | 3/4 in. | 3/4 in. | 3/4 in. | 1 3/8 in. | 1 1/2 in. | 1 3/8 in. | 1 1/4 in. |

Utah has a wide range of weather, including different precipitation. Much of Utah is a desert, which is land that receives less than 10 inches of rain in one year. Use your line plot to answer the following:

Based on the average precipitation in Salt Lake City, is it a desert?

What is the difference between the month with highest precipitation and the month with lowest precipitation?

[](http://www.google.com/imgres?num=10&hl=en&biw=1725&bih=757&tbm=isch&tbnid=kHkZdVTCmX1FsM:&imgrefurl=http://www.luminous-landscape.com/essays/the_paper_that_almost_got_away.shtml&docid=BJXwPuRR2tXLLM&imgurl=http://www.luminous-landscape.com/articleImages/Rain_Storm-Moab-Edit.jpg&w=800&h=532&ei=8xr_T8aiHcrkqAHwybiNCQ&zoom=1&iact=hc&vpx=164&vpy=293&dur=59&hovh=183&hovw=275&tx=137&ty=85&sig=100349638418202765776&page=1&tbnh=127&tbnw=169&start=0&ndsp=32&ved=1t:429,r:8,s:0,i:101)

Rainmaker Part 2

Below is a table of average monthly precipitation in Parowan. Create a line plot for this data, then answer the questions below.

Parowan’s Average Monthly Precipitation

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| January | February | March | April | May | June | July | August | September | October | November | December |
| 1 in. | 1 in. | 1 3/8 in. | 1 1/4 in. | 1 in. | 1/2 in. | 1 in. | 1 1/2 in. | 1 in. | 1 3/8 in. | 1 1/8 in. | 3/4 in. |

Compare the two line plots and record your observations.

*To think about:* Which city gets the most precipitation? Is Parowan a desert? Why is does one city get more precipitation than the other?

[](http://www.google.com/imgres?num=10&hl=en&biw=1725&bih=757&tbm=isch&tbnid=14VFCsvXFyBPeM:&imgrefurl=http://www.flickr.com/photos/ideaholic/3294856898/&docid=msF7Sm9xWJzXZM&itg=1&imgurl=http://farm4.staticflickr.com/3577/3294856898_b2dacc4a5d_z.jpg&w=640&h=480&ei=8xr_T8aiHcrkqAHwybiNCQ&zoom=1&iact=hc&vpx=672&vpy=146&dur=4801&hovh=194&hovw=259&tx=171&ty=141&sig=100349638418202765776&page=1&tbnh=132&tbnw=176&start=0&ndsp=32&ved=1t:429,r:3,s:0,i:85)